Singapore Welding Society

DECEMBER 2015 MCI (P) 076/11/2015

WELDPOINT

HIGHLIGHTS

SINGAPORE WELDING SOCIETY

MORE INSIDE >

WELDPOINT TEAM

For general enquiries, please contact us at:
SINGAPORE WELDING SOCIETY
INNO Centre
Blk 1003, Bukit Merah Central
#04-16
Singapore 159836
Tel: (65) 6779 7706
Fax: (65) 6274 4055

SWS Newsletter is published by the SINGAPORE WELDING SOCIETY

SWS Newsletter is now available online
WWW.SWS.ORG.SG

PRESIDENT'S MESSAGE

Warmest Greetings!

As the year draws to a close, SWS has every reason to feel contented and to look forward to more great years ahead. We are very pleased to inform you that we have managed to deliver several exciting benefits for our members during the past six months of the current term. We always welcome your invaluable feedback and suggestions for improvement.

New SWS Home

Please bear with me if I sound a bit excited as I would like to share with you an important milestone for SWS. Our society has purchased a property to establish our permanent 'SWS Home'. When ready, the place will house our secretariat, training /meeting room and a cosy corner for members to meet and relax. The property is located at the popular TradeHub 21 along Boon Lay Way and has a spacious floor area of 1484 sqft. With the Urban Redevelopment Authority's (URA) promising vision for the Jurong Lake District and our close proximity to it, we are confident that it is a worthy long-term investment for SWS. More details are shared by the Chairman of Property Acquisition Committee (PAC) later in this issue. My appreciation and heartfelt gratitude to the members of the PAC and my fellow colleagues in the Council for making this possible. Credit should also go to the previous council (2014-15) that had the vision to table this resolution as well as the members who had overwhelmingly supported it at the AGM.

Technical Talks and Seminars

Our Technical Talk committee has done a commendable job. Over the past six months, the committee had organized talks on six exciting topics. It was also for the first time that we had a talk on a soft-skills topic (Financial Planning Begins Now – Measuring Your Financial Fitness) and it was well received. Two technical talks/seminars were organised by an institutional partner SIMTech, a member of A*Star and extended to SWS members.

Our sincere appreciation goes to SIMTech. Let me also express my appreciation and sincere thanks to our corporate members who had sponsored and delivered technical talks for the benefit of our members. My appeal to every individual SWS member is that you should attend these talks and benefit from the knowledge shared. In addition, a great networking opportunity exists at these events.

Membership Highlights

The SWS Membership Committee is now in top gear. By the time you read this, our first-ever bowling tournament for members should have been over. Thank you for participating in the event and I am sure you had great fun. The council will make it a regular annual event for our members if there is good support. Also for the first time, the committee has launched a 'SWS Member-Get-Member (MGM)' campaign. No one knows better the benefits SWS can bring to its members, than you. So, I encourage you to share your SWS membership experience with your colleagues and friends, bring them on-board and get handsomely rewarded for doing so! Please refer to the details in this issue. As I have said earlier, the society is only as strong as its members!

Education and Training

The Education and Training Committee continues its efforts in bringing welding and plant inspection related education, training and certification programs to you. In spite of the reducing demand due to local market saturation and competition from other providers in the region, we are still able to deliver the AWS and API training programs, albeit with smaller numbers. Our corporate members continue to support our SWS programs as we bring in experienced trainers and deliver quality training for our members. I also hope to see you at the upcoming one-day workshop on 'Stainless Steel in Architecture and Construction' that we are organizing with the Nickel Institute. Our much anticipated Welding Engineer program to be offered together with the Japan Welding Engineering Society (JWES) has been scheduled for Jan 2016. You may refer to the details in our previous March 2015 article of Weldpoint. The committee works hard to make these programs viable and also cost efficient for the participants. I hope that all corporate and individual members will continue to support and participate in our programs.

Looking forward to 2016

There is perhaps one positive that the slowdown in the economy brings - companies get the time and the opportunity to undertake a close review of operations and to introduce streamlining and process improvements. It is also an ideal time for companies to examine their workforce capability and look closely at the skill needs of their employees for the future upturn in the economy. This is not just true for the companies but for every one of us, individuals as well. Let's now re-examine our toolbox (knowledge and skillset) and identify what is lacking and how we could acquire or sharpen our tools for better years ahead!

Warmest Seasons Greetings to you and your families and best wishes for good health and happiness in the New Year!

Perianan Radhakrishnan
President
Singapore Welding Society

SWS NEW PERMANENT HOME

By Mr Juerg Schweizer Chairman, Property Acquisition / Assistant Chairman, Technical Talk

Address : 18 Boon Lay Way, #08 – 112, TradeHub 21, Singapore 609966

At the last SWS AGM in May 2015, the members had overwhelmingly approved the purchase of a property to serve the needs of our members as well as to achieve the long term goal of establishing SWS's own office

Soon after the AGM, the council wasted no time in forming a Property Acquisition Committee (PAC) to actively seek suitable premises to house our secretariat office and training facility. The PAC is chaired by Mr Juerg Schweizer (JS) and comprises the following members:

- Mr Juerg Schweizer (JS), Chairman, PAC
- Mr P. Radhakrishnan, SWS President
- Mr Sze Thiam Siong, SWS Hon. Secretary
- Mr Goh Lak Hee, SWS Hon. Treasurer
- Mr Lester Lee, SWS Corporate Member
- Mr Gerry Lim, SWS Corporate Member
- Mr Eddie Ko Beng Lee, SWS Vice President

The PAC with the approval of the Council had engaged an experienced real estate agent on industrial property to source for an ideal property which can meet the following criteria:

1. Within the budget approved at the AGM
2. Close proximity to MRT and/or bus station (convenient to members)
3. Sufficient space to house the SWS secretariat office and training facility
4. Prominent and/or reputable location (for probable capital appreciation)
5. Availability of ample car parking space
6. Availability of food/drink stalls
7. Acquisition can be carried out in the shortest possible time
8. Condition of the premises

The property agent provided a list of possible sites for the PAC to view. After numerous visits to the sites at Bukit Batok Industrial Parks, Toh Guan area buildings and surrounding areas, the PAC decided to narrow down their options to several units at TradeHub 21. The PAC finally selected one unit at TradeHub 21 which meets the conditions stipulated above. We were able to secure the said premise with the professional advice of our real estate agent. A lawyer has been appointed to handle all sales transactions on behalf of the Society.

As advised by the lawyer, the Society has to appoint at least two trustees approved by the Council to hold the property on behalf of SWS. After much deliberation, the Council nominated and approved two long standing council members, Mr Eddie Ko Beng Lee and Mr Goh Lak Hee with their consent to be the trustees for this property.

Once the purchase agreement has been finalized and after taking over possession of the said office space, the PAC will continue its work of planning the office and training facility.

We are indeed very excited and happy to achieve this mission in a relatively short period of time. We hope to update all of you on the progress of the new office cum training facility via Weldpoint and email communication. So stay in touch and look out for new updates in the next issue.

SWS COUNCIL MEMBERS OF 2015 - 2016

Mr Perianan Radhakrishnan	President
Mr Eddie Ko Beng Lee	Vice President / Chairman, International Affairs
Dr Sun Zheng	Vice President
Mr Sze Thiam Siong	Honorary Secretary / Immediate Past President
Mr Goh Lak Hee	Honorary Treasurer
Mr William Chong Jun Hua	Assistant Treasurer
Mr Chow Ngai Mun	Chairman, Education & Training / Past President
Mr Kelvin Lee Chee Fatt	Chairman, Publications
Dr Zhou Wei	Chairman, Standardization & Consultancy
Mr Juerg Schweizer	Chairman, Property Acquisition / Assistant Chairman, Technical Talk
Mr Ivan Lim Poh Huat	Chairman, Common Welder Qualification Scheme (CWQS)
Mr Foo Hoe Ming	Chairman, Technical Talk
Mr Md Habibur Rahman	Assistant Chairman, Common Welder Qualification Scheme (CWQS)
Mr Yusoof Aynuddin	Chairman, Membership
Mr Khoo Kok Leong	Assistant Chairman, Membership

We Get You Protected As You Weld

Leeden Safety offers head-to-toe protection against exposures to infra-red radiation, metal fumes inhalation and physical welding spatter protection.

SR 590

- Constant supply of air keeps the visor demisted
- Adjustable head harness
- Mountings for yoke type head set
- Accessories in the form of automatic welding lenses, correction lenses, neck protection, welding hood and hose protection
- Supplied with welding lens of shade number 10

SR 500

- An easily accessible button controls the start, stop and selection of air flows (175 or 225 l/min)
- Automatic air flow
- Audible, optical and vibration alarms
- SR 501 STD lithium-ion battery (14.8 V 2.2 Ah) with a charging time of 80% in 30 min and 100% in 1.5 hours
- SR 502 heavy duty lithium-ion battery (14.8 V 3.6 Ah) with a charging time of 80% in 45 min and 100% in 2 hours
- An operating time of up to 13 hours depending on filter selection and battery type

Other Protections Available:

Respiratory Protection · Eye Protection · Face Protection

Leeden Safety
A business unit of Leeden National Oxygen Ltd

Leeden Safety
1 Shipyard Road, Singapore 628128
E: sgsales.safety@leedennox.com
Website: www.leedennox.com
T: (65) 6268 1221
F: (65) 6268 2838

Singapore • Malaysia • Indonesia • Thailand • China • Vietnam • Philippines • Australia

RECENT TECHNOLOGY ADVANCEMENTS IN PLASMA CUTTING OF STAINLESS STEEL

By: Mr Steve Liebold and Mr Jon Peters, Hypertherm Mechanized Plasma Engineers and Mr Jesse Tyler, Marketing

Plasma cutting of stainless steel has a long history, and recent technology advancements by Hypertherm have dramatically improved the quality of cut, increased the range of thickness for piercing and cutting capability achieved. While stainless steel accounts for a relatively small percentage of the world-wide steel consumption, it is vitally important to economies, particularly in the energy and food processing markets.

There are several cutting technologies used for stainless steel. Most commonly used techniques are plasma, band saws and waterjets for a broad thickness range. For thinner materials, lasers and sheers are preferred. Using plasma, which consists of thermal energy and high velocity gas to melt and remove materials from the cut surface provides several advantages such as fast cut speeds – as compared to band saws and waterjet systems, thicker cutting capability than lasers as well as the flexibility to quickly switch from severing 160 mm (6-1/4") stainless to cutting fine features in thin stainless, aluminum and mild steel.

Early plasma systems designed for cutting thick stainless steel used very high amperage and delivered slow cut speeds as compared to recent advances. An example of this was the Hypertherm PAC500 that used nitrogen as the plasma gas and water injection for the shield to cut 75 mm (3") at 380 millimeters per minute (15" ipm) with 750 amps. To cut 125 mm (5") stainless steel, H35 (35% Hydrogen, 65% Argon) plasma gas was used with a water skirt of coaxial flow at a staggering 1000 amps with a cut speed of only 150 mm/min (6" ipm). These early systems such as the PAC500 did not support lower amperage cutting, thus additional machines were required for cutting fine features in thinner material.

Modern capabilities to cut stainless steel with plasma vastly improved outcomes. An expanded range of gas choices and amperages allowed customers to select and ensure the best process, cut speeds and desired cut quality to suit their needs. There is also a range of thickness to choose from: thin (0.8-6 mm), mid-range (6-50 mm) and thick (50-160 mm). The HyPerformance HPR800XD can cut stainless steel from 0.8 mm (20 gauge) through to 160 mm (6-1/4") with multiple processes and amperages to pick from. Customers can choose the best amperage for a given thickness to determine the ideal balance of productivity and cut quality.

For customers with experience cutting mild/carbon steel, expanding into cutting stainless steel brings several new challenges and factors that must be considered to ensure success. There are three key factors to consider: 1) gas types and selection, 2) cut speeds and 3) technology requirements for different thicknesses. When cutting mild/carbon steel, oxygen plasma gas and air shield can effectively deliver excellent cut quality across the full range of thicknesses. Stainless steel cutting success requires different gas selections and consumable technology for different thickness ranges and grades.

Proper gas selection is the first step towards success in plasma cutting stainless steel. Air/Air is a common choice for fast cut speeds at low costs but the heavily oxidized black surface finish often requires labor intensive secondary operations. Depending on the requirements of the finished piece, there are several additional options to choose from. Nitrogen plasma gas and shield (N2/N2) delivers increased cut speed with a smoother cut surface and fewer oxides formed but it produces a black cut surface which is similar to Air/Air. Top edge rounding and significant angle may also result.

Customers who require a more refined cut surface with good color, sharp top edge with limited angularity and dross will need to use specialty gases to achieve the best results. The modern N2/H_2O process is effective for stainless steel cutting on thin and mid-range stainless, but the impact of water on dry downdraft tables should be considered before selecting that option. Cutting with plasma gases containing hydrogen will produce improved cut edges with color similar to the base material. The two most common specialty

gases containing hydrogen are H35 (35% Hydrogen and 65% Argon) and F5 (5% Hydrogen, 95% Nitrogen).

Plasma Gas	Shield	Result
Air	Air	Pro: Fast, minimal dross, square edge, inexpensive, low cost
		Con: Surface is black, rough and heavily oxidized, secondary operations often required
N2	N2	Pro: Smoother than air cutting, fewer oxides formed
		Con: Edge is black, top edge is rounded, significant angle can result
	Water	Pro: Silver to straw colored surface, sharp top edge, fume suppression, low cost
		Con: Water management, potential impact when used on a dry/downdraft table
F5	N2	Pro: Silver color, good cut angles and sharp top edge
		Con: Thickness limitations, useful to 3/8"
H35	N2	Pro: Gold to blue to gray color, square cut edge
		Con: Gas mixture not really available in all regions, limited to mid-range thickness and above (dross results on thin stainless)

Figure 1. The pros and cons of different gas options

Gas options – outcomes

Air/Air

N2/N2

H35 & N2/N2

H35/N2

F5/N2

Figure 2. Visual for different gas option outcomes on 304L

This brings us to the next consideration for success in cutting stainless with plasma- material selection. 304L is an austenitic stainless steel and the most commonly used grade world-wide. But using a plasma process engineered for cutting 304L on another similar austenitic alloy (e.g. 316L) can result is dross and rough cut edges.

This is a classic example of 'one size does not fit all'.

Figure 3. The results of using the 304L process settings for both 304L 5 mm and 316L 5 mm are demonstrated here

Note how the 304L cut is clean with no visible dross. The 316L cut was improved to the same cut quality of the 304L cut by slightly increasing the cut speed and the shield pressure. Each material type will respond differently to plasma cutting. The wide range of stainless steel options requires an equally wide range of cutting processes for best results.

Additional challenges presented by plasma cutting of stainless steel include molten material viscosity and piercing. While cutting mild steel with O2/Air, the viscosity of the molten material is much lower than when cutting stainless steel. Thus, the resulting dross that hardens on the bottom of the plate is easily removed and often does not require secondary operations like grinding. With stainless steel dross, the viscosity is much higher so it can be very challenging to remove. The following five factors can reduce or even eliminate stainless dross formation:

1. Design of the equipment
2. Gas type/selection
3. Gas settings
4. Cut speed
5. Cut height

One method of preventing dross is to swirl the shield gas in the opposite direction of the plasma gas. This causes the dross to adhere to the skeleton of the plate instead of the cut piece.

Piercing stainless steel is challenging because of the molten material properties. Slag piles (accumulated dross on the surface of the plate surrounding the pierce hole) build up and present issues for parts nest layout and torch movement. When piercing stainless steel above 50 mm (2"), it is common to adjust the torch movement to accommodate the slag piles, or to pierce, stop, then scrape the dross before it hardens and adheres, and then proceed to cutting the part

Figure 4. 1.75" 304L pierced with 400A H35 plasma. Slag piles resulting from piercing, note the pile height exceeds standard cut height for torch.

Recent Technology Advancements:

The best possible plasma cut quality on thin stainless has been achieved with the HyDefinition vented nozzle process Hypertherm developed to advance cut quality on mild steel. For the first time, that same technology is being applied to stainless steel cutting to deliver the best results for thin stainless steel. The higher gas volume with the vented nozzle increases pressure to form a tighter constriction on the plasma arc, which enables the use of a smaller nozzle bore and higher energy density. Venting improves the nozzle life by constricting the arc and the higher flows cool the nozzle.

HyFlow™ Vortex Nozzle

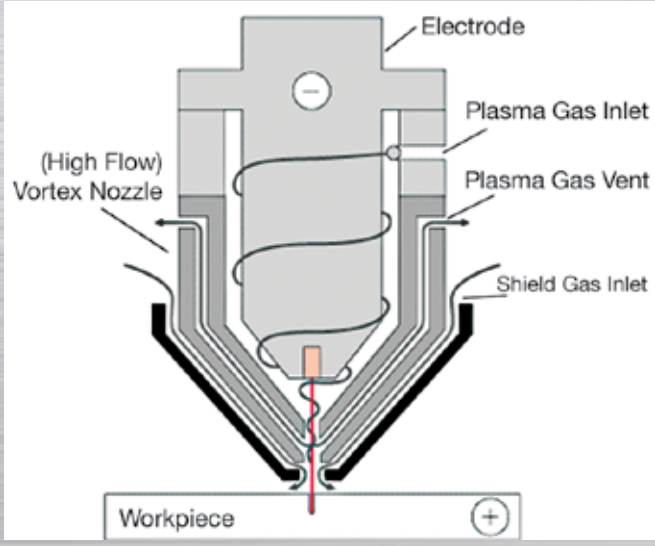


Figure 5. Hyflow™ Vortex Nozzle

HDi (HyDefinition inox), Hypertherm's new HyDefinition technology for thin stainless steel delivers extremely sharp top edge quality, shiny surface finish and superior angularity with reduced angle variation. Advanced torch and consumable technologies deliver more consistent cut quality for the duration of the consumable life. So the key benefit of HDi is that it combines great cut quality with extended consumable life for consistent, productive and cost effective results.

Advancements in mid-range stainless steel cutting returns to the topic of gas selection - using H35 delivers the benefit of a non-oxidized edge with good cut quality and cut edge color but from a productivity standpoint, the cut speeds are slow. Nitrogen has the advantage of much faster cut speeds for increased productivity, but the cut edge is oxidized. Unique to the HPRXD auto-gas console is the ability to mix H35 and N2 as the plasma gas, to significantly improve the cut speeds while maintaining the desirable silver or gray cut edge.

Gas Options – H35-N2 Mixture

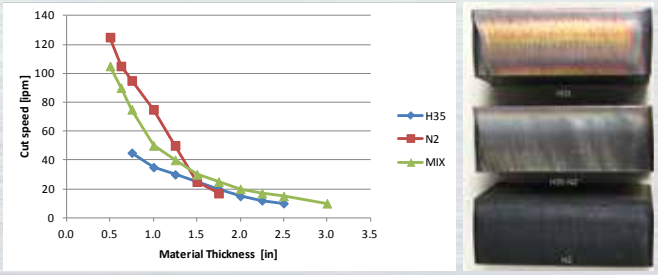


Figure 6. Gas Options

Adjusting the proper gas mix for different materials may be required. Too much N2 will result in a gray to black cut surface with the likelihood of some dross accumulation. Too much H35 will result in a gold color on the cut surface and dross build-up.

WPatented PowerPierce technology improves both mild steel and stainless steel cutting success across a wide range of thicknesses and it has proven to be the technology vital to extending the thick stainless steel piercing and cutting range of plasma far beyond what was previously attainable. The liquid cooled shield repels molten material that can adhere to the torch shield during piercing.

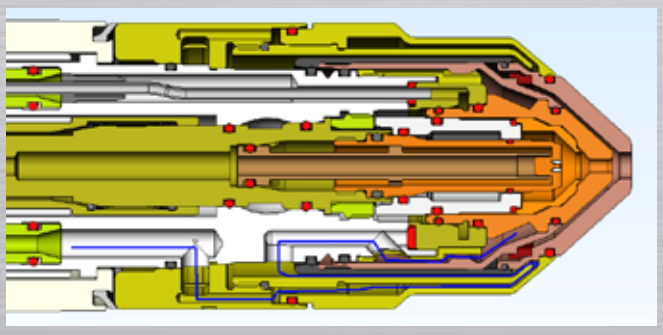


Figure 7. New: Liquid-cooled shield technology repels molten metal during piercing

- Significantly reduces dross adhesion
- Reduces o-ring melting
- Reduces interference with initial height sensing
- Reduces clogging of the shield's vent hole
- Reduces orifice melting

Hypertherm utilizes two pierce ratings for HPR400XD and HPR800XD: production piercing and the new innovative controlled motion to deliver maximum pierce. The production piercing rating test criteria is the ability to successfully stationary pierce (up and down motion) a given thickness 300 times with one set of consumables. If a system can only pierce a certain thickness 250 times, the thickness is lowered until the complete 300 pierce test is successful.

The new maximum pierce rating utilizes a tightly controlled moving pierce technique to extend the HPR400XD production pierce rating from 45 mm (1-3/4") to 75 mm (3") and the HPR800XD production pierce rating from an industry leading 75 mm (3") to an unprecedented 100 mm (4"). Testing for the new maximum pierce at 400 amps delivered 50 pierces; 25 pierces were delivered at 800 amps.

While so-called moving or "flying" pierce processes have been practiced for many years, the new process shown below provides the advantage of minimal pierce length - usually only about as long as the material is thick. It essentially involves controlling table motion with torch height, to create a trough which enables the slag to exit the pierce hole and direct it away from the torch front-end. The pierce is initiated as high above the plate as the power supply will allow, without losing the arc and then traversing at a relatively high (gouging) speed to create the trough. The torch then begins to drop. At the same time table motion slows until the pierce is achieved and normal cutting speed ensues.

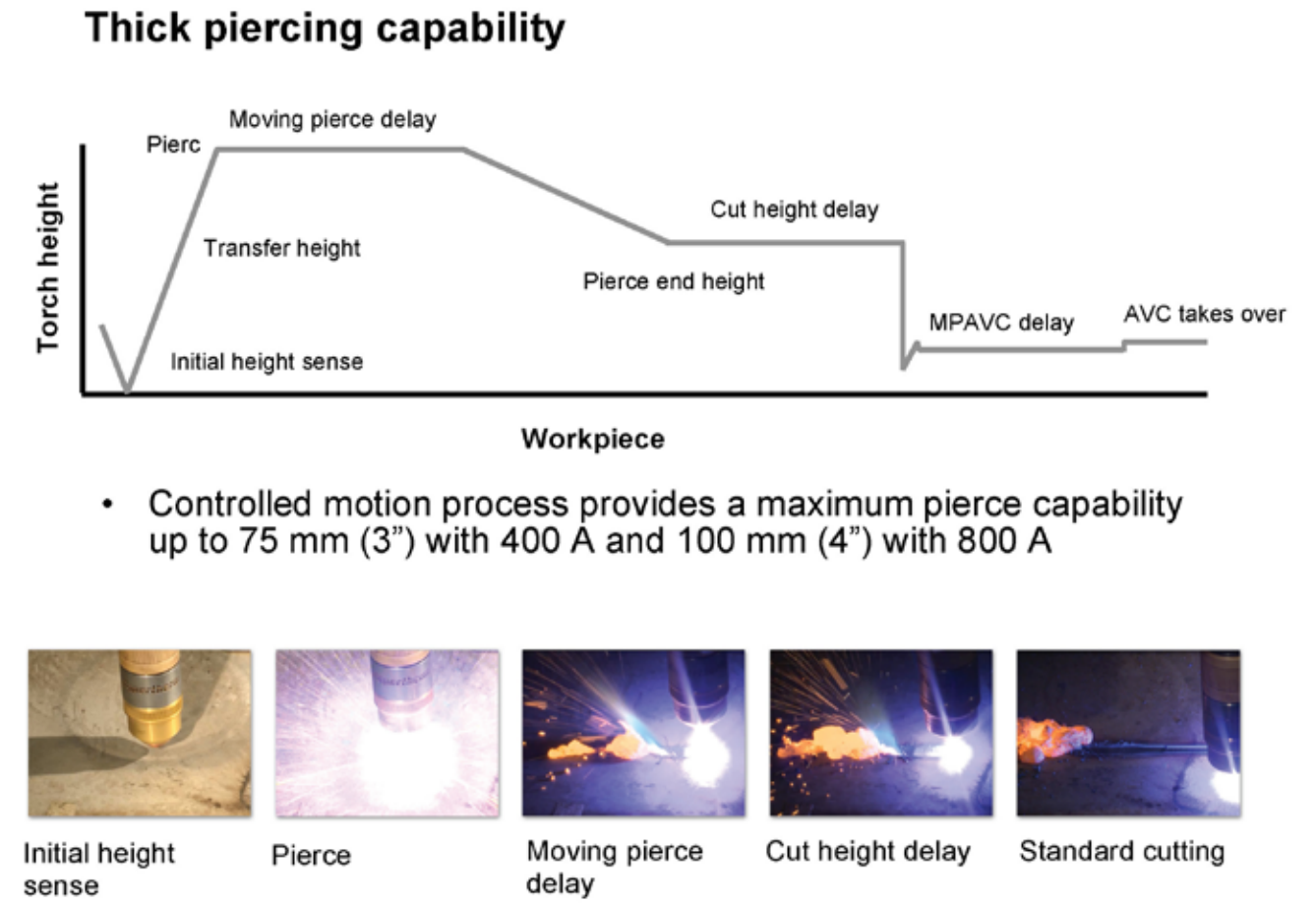


Figure 8. Thick Pierce Diagram

The extended thickness capability for piercing and cutting stainless steel brings with it a new challenge due to the physics of plasma - the arc lags behind the torch at around 15 degrees, so when cutting a thick part in a nest, a small tab may result that causes parts to stick to the nest and internal features that have pronounced dings, bumps or nubs. A new 'dogleg' technique developed by Hypertherm engineers efficiently addresses this challenge while minimizing any additional plate consumption.

The dogleg method for thick stainless steel takes advantage of this lagging arc by focusing it onto the tab section of the cut. At the point where the leading kerf edge breaks into the lead-in edge (and before the voltage reaches the critical value of the transformer), the cut path changes direction into an acute angle (60 degrees works well) towards the skeleton. This allows the arc to transfer to the skeleton material, which reduces the voltage while driving the molten material down towards the tab and subsequently melting it off.
In summary, plasma cutting can be used productively to cut stainless steel ranging from very thin to very thick. Proper gas and current selection results in clean, high quality cuts and new technologies have improved the outcomes on thin, mid-range and thick stainless steel.

SEMINAR ON ADVANCED WELDING & CLADDING TECHNOLOGIES

By: Dr Sun Zheng, Vice President

A seminar on Advanced Welding & Cladding Technologies was co-organized by Eutectic+Castolin, ESI Group and SIMTech on 19 August 2015. Among more than 100 participants, more than 30 were SWS members. Welding, cladding and thermal spraying are some of the most predominant processes applied in various manufacturing industries such as Aerospace, Automotive, Marine, Oil & Gas and Offshore as well as the Petrochemical & Power and Generation & Precision Engineering industrial sectors. The objective of this seminar was to create awareness on the new advancements in welding and cladding technologies as well as to highlight the state-of-the-art welding simulation and modelling software so as to meet the increasing demands and challenges in these processes.

Mr Marcin Melcer from Eutectic+Castolin (Poland) shared on the company's latest products and case studies on plasma transfer arc (PTA) welding and cladding. Mr Nikkeshraj Sivasubramanian from ESI Group SEA (Malaysia) highlighted ESI's welding simulation and modelling software capabilities. Dr Chen Hui-Chi then made a presentation on welding and cladding capabilities at SIMTech and R&D collaborations with the industry. The seminar ended with a roundtable discussion where feedbacks from various industries were solicited. These feedbacks reveal the importance of establishing and further upgrading capabilities in welding & cladding technologies for the local welding industry.

Choose filler metal for various combinations of base metals with the ***Haynes Welding Smart Guide*** *at* ***www.haynesintl.com.***

Our wire products bring your projects together.

We are a full-service developer, manufacturer, and distributor of **HASTELLOY®** and **HAYNES®** nickel and cobalt alloy wire products. No order is too large or small for our worldwide stocking locations.

Our Standard Wire Product Forms

- RTW™ Filler Wire
- Coated Electrodes
- Cut-Length TIG
- Layer Wound Precision
- Structural Wire
- Rod Coil/Redraw
- Thermal Spray
- Loose Coil

HAYNES
International

Haynes Pacific Pte Ltd., Singapore
Telephone: 65-6468-8768
Email: sales@haynespacific.com.sg • Web: www.haynesintl.com.

Aristo® Mig 4004i Pulse

Light weight multi process inverter welding equipment

ESAB®

- Ideal for thin plate welding in stainless steel and aluminum
- QSet-Easy to use intelligent welding system
- SuperPulse-the welding process with ability to control the heat put($U8_2$)
- Pre-programmed synergic lines to ensure optimum settings with a wide choice of materials
- Wide input voltage tolerance
- Water cooled and air cooled capabilities

Contact us now for a free demo at your facility!
Tel: +65 6318 2608 Email: machines@esabasia.com

SWS CELEBRATING SG50 – SINGAPORE'S GOLDEN JUBILEE 2015

Financial Planning Begins Now – Measuring Your Financial Fitness

By Mr Foo Hoe Ming - Chairman Technical Talk

In conjunction with the SG50 celebration, Singapore Welding Society organised a life skill talk on Financial Planning on the 23 September 2015 at the NTU Alumni Club. This special event was aimed at encouraging interaction and sharing among our members, families, friends and colleagues in hopes of widening our awareness on the importance of financial planning.

The speaker on the topic was Mr Tan Swee Chiew from the Institute for Financial Literacy (IFL). IFL is a partnership between Singapore Polytechnic and MoneySENSE. *(For more information on MoneySENSE, please visit www.moneysense.gov.sg)*

The evening's event started with a sumptuous dinner at our familiar corridor outside the lecture room at the NTU Alumni Club. The atmosphere was casual and there was much mingling and exchanges among our members, friends and colleagues.

The speaker spoke about the significance of early financial planning and shared his expert knowledge with us through the presentation in the following outlines

- Setting your financial goals and priorities
- How to set S.M.A.R.T financial goals
- Discovering your financial fitness
- How to assess your financial fitness
- Work out your net cash flow position
- Understanding your net worth and financial ratios
- Assessing your financial situation
- Guidelines for effective family budgeting

The life skill talk on financial planning was well received and the training enhanced our understanding of the financial planning process. It enabled us to learn how to assess our financial situation and to know our financial fitness through the use of financial statements and ratios.

We thank Mr Tan Swee Chiew and the Institute for Financial Literacy for imparting the free and unbiased financial knowledge to our participants. (*For further information and details on other programmes, please visit www.finlit.sg)*

AWF MEETINGS IN SURABAYA, INDONESIA

By Mr Eddie Ko, VP & Chairman of International Affairs

From 21st to 23rd October 2015, the Indonesia Welding Society hosted the 17th Task Force Meeting and the 24th AWF Governing Council Meeting at the Majapahit, a Dutch colonial-style heritage hotel in Surabaya. The AWF event was planned to coincide with the opening ceremony of the 2nd International Welding and Joining Conference organised by the Surabaya State Polytechnic of Shipbuilding. Member countries were cordially invited to participate in the opening ceremony of the conference as well as a welcome reception specially arranged for the evening.

Over the next three days various task force committees and review working groups were in sessions to discuss, identify, develop best practices and recommend new proposals on ISO Standardisation, AWF website, CWCS, WPS, Audit, Training and Education, etc. At the conclusion of these meetings, resolutions and proposals were put forward to the Governing Council (GC) for deliberation and implementation as appropriated.

Delegates and observers from the Indonesia Welding Society (IWS), Chinese Welding Society, Institute of Materials Malaysia, Malaysian Welding & Joining Society, Myanmar Welding Society, Philippines Welding Society, Thai Welding Society, Singapore Welding Society and Japan Welding Engineering Society (JWES) together with representatives from the Japan Welding Technology Centre and Kobe Steel Limited had plenty of opportunities in the day to interact and reflect on issues relating to welding, NDT and other topics of common interest. After a busy work schedule, great opportunities were also available on each evening for members, guests and IWS staff to mingle in a relaxed environment over dinner at popular local venues selected by the host country.

One significant item that has brought much debate from member societies concerns the AWF Charter. To ensure an acceptable conclusion and with the approval of the GC, JWES initiated a new working group (WG) with the objective of carefully examining if a revision to the Charter is required. The countries that have volunteered to sit in this WG are Indonesia, Philippines, Japan, Singapore, Korea, Malaysia, Thailand and China. The WG is expected to have its first detailed discussion in a meeting to be organized in January 2016 in Singapore. The recommendation will then be presented to the GC at the next AWF meeting which is scheduled for April 2016 in Osaka, Japan.

We congratulate the Indonesia Welding Society representatives for hosting these AWF meetings and are grateful to them for their caring hospitality extended to us.

SWS TECHNICAL TALK FOR THE MONTH OF JULY AND AUGUST 2015

By Mr Foo Hoe Ming, Chairman Technical Talk

Presented by GE Measurement & Control and Micro-Tech Supplies & Services Pte Ltd

We are privileged to have GE Measurement & Control and Micro-Tech Supplies & Services to give us two technical presentations on Non-Destructive Testing consecutively in July and August. The events were co-organised by GE M & C, Micro-Tech and SWS to provide our members with updates on the recent improvements in digital radiography and the available technology for real-time collaboration with remote experts in electromagnetic inspection. The good response from our members for these two non-destructive testing topics indicated the increased interest of our members in non-destructive testing and that NDE is an integral part of the metal joining & welding technology.

GE Inspection Technologies (GEIT) as part of GE Measurement & Control provides inspection solutions for the oil & gas, power, aerospace and transportation industries. These include the computed radiography and electromagnetic inspection (eddy current) solutions presented to us as follow.

Weld Inspection According to ISO 17636-02 for Digital Radiography

On 24 July 2015 at the NTU Alumni Club

The talk was presented by Mr Denis Kiesel who is the Asia Product Sales Leader for Radiography. He is responsible for the sales of radiographic film, digital detectors and imaging devices, software, X-ray generators & systems and test machines.

Non-destructive testing of welds radiographic testing Part 2: X- and gamma-ray techniques with digital detectors (ISO 17636-2:2013)

Mr Denis Kiesel started the talk with an introduction of the digital radiography (CR) technique and explains the most important parameters regulated by the new ISO 17636-02, details of the talk is as presented in the technical paper below.

CR Systems for use in weld inspection with adherence to ISO17636-02

By: Kiesel, Denis, GE Measurement & Control PTE. LTD. Singapore

Introduction

More and more typical radiographic applications get converted into digital solutions. Due to the similarities to traditional film methods in setup and handling, one of the most favoured conversion technologies is Computed Radiography Systems. The quality of these systems and the comparability to radiographic exposures has long been discussed and the trade between spatial properties and contrast resolution differences has led to new specifications and standards in measuring the system performance and quality.

GE Inspection Technologies as part of GE Measurement & Control understands their NDT business as 'Healthcare for Industry'. In this spirit we have driven the digital conversion from the start and are as a leader in this process, constantly sharing our experience, progress, recommendation and outlook. One of the essentials to a save and transparent conversion is to understand the differences in technology, the drawbacks & advantages and also to understand how to work with the new relevant standards for this technology when it comes to weld applications. This paper will make the effort to walk you through the most important steps of film to digital conversion for welding.

1. Introduction of the new ISO 17636-02

   The new ISO 17636-02 standard guides weld inspectors in their process of setting up the inspection and ensuring they can meet the required image quality standard.

   6 Main topics are covered in the standard with 4 of them being equivalent to the procedures in Film Radiography.

2. Parameters for weld applications with Digital RT
   1) Minimum score for wire type or step-hole type Image Quality Indicators (IQI's) in function of test technique
   2) Maximum image un-sharpness requirements (BSR = Basic Spatial Resolution, determined using a duplex wire gauge)
   3) Choice of tube voltage or gamma source in function of object composition and penetrated thickness
   4) Minimum normalized signal to noise ratio (SNRN) requirements [Determine SNR (Signal to Noise Ratio) and BSR]
   5) Anti-scatter filter type & thickness
   6) Source Detector Distance

A. Minimum IQI score for wire type or step-hole type IQI
Same like on Film technique, the image contrast need to get measured with either wire IQI or Hole IQI. *Table 1* and *Illustration 1* show that the operator receives clear guidance on what IQI is required for each thickness range.

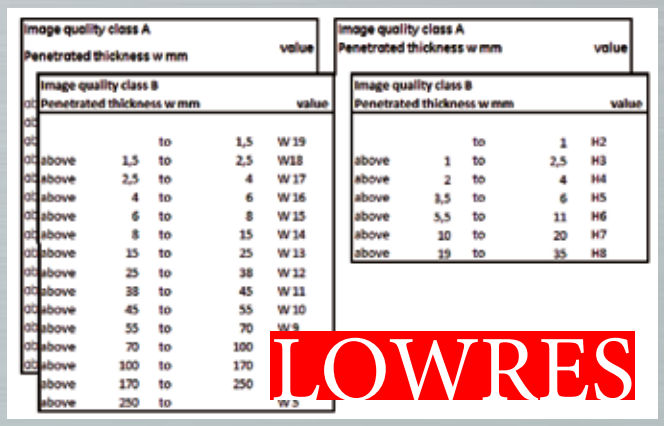


Image quality class A

Penetrated thickness w mm				value
above	1,5	to	2,5	W18
above	2,5	to	4	W 17
above	4	to	6	W 16
above	6	to	8	W 15
above	8	to	15	W 14
above	15	to	25	W 13
above	25	to	38	W 12
above	38	to	45	W 11
above	45	to	55	W 10
above	55	to	70	W 9
above	70	to	100	
above	100	to	170	
above	170	to	250	
above	250	to		W 3

Image quality class B

Penetrated thickness w mm				value
		to	1,5	W 19
above	1,5	to	2,5	W18
above	2,5	to	4	W 17
above	4	to	6	W 16
above	6	to	8	W 15
above	8	to	15	W 14
above	15	to	25	W 13
above	25	to	38	W 12
above	38	to	45	W 11
above	45	to	55	W 10
above	55	to	70	W 9
above	70	to	100	
above	100	to	170	
above	170	to	250	
above	250	to		W 3

Image quality class A

Penetrated thickness w mm				value
above	1	to	2,5	H3
above	2	to	4	H4
above	3,5	to	6	H5
above	5,5	to	11	H6
above	10	to	20	H7
above	19	to	35	H8

Image quality class B

Penetrated thickness w mm				value
		to	1	H2
above	1	to	2,5	H3
above	2	to	4	H4
above	3,5	to	6	H5
above	5,5	to	11	H6
above	10	to	20	H7
above	19	to	35	H8

Table 1

The Standard also differentiates 2 Inspection classes, Class A and B, which is in line with conventional Film Radiography requirements.

Illustration 1

B. Basic Spatial Resolution BSR

Table 2 below shows the image requirements in respect to the image sharpness. This so called BSR concept is taken from the EN 14784-1

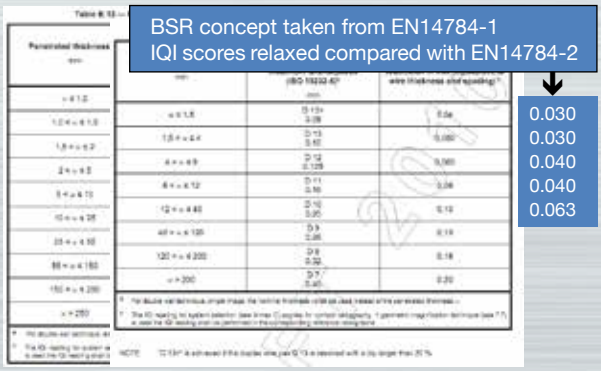


Table 2

The BSR is measured with a Duplex Wire indicator as shown in *Figure 1*. The last wire-pair of the Duplex Wire Gauge that is not resolved with an amplitude of equal or higher than 20% in the dip between the 2 wires is the one that determines the threshold resolution and is used for calculation of the normalized SNR of the image.

Example: Duplex wire gauges according to *Figure 1*.

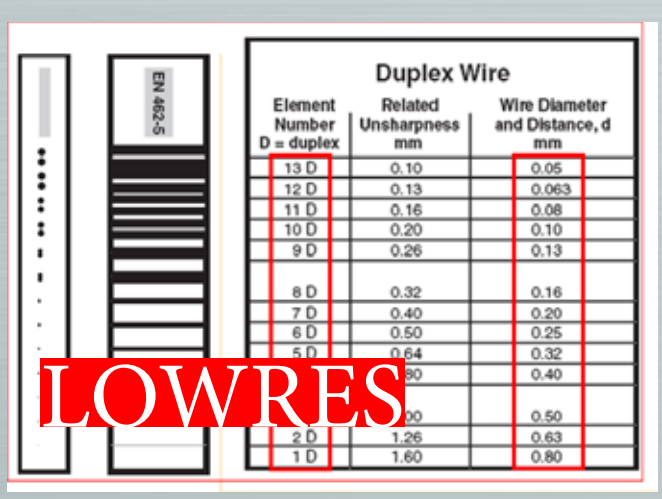


Figure 1

After exposure, the software tool for line histogram needs to get used to get the appropriate threshold response.

C. Tube Voltage or Gamma source choice

The choice between tube voltage and gamma source is a function of material composition and penetrated thickness.

ISO17636-02 introduces the idea of 3 compensation principles. With the introduction of a tube voltage recommendation for different materials, the Standard allows compensation of Signal to Noise Ratios (SNR) by lowering tube voltages or increasing tube voltages if sufficient SNR is given. *Diagram 1* shows the idea to look up the maximum recommended voltage (U) for a given material 1,2,3,4 at a given material thickness (w).

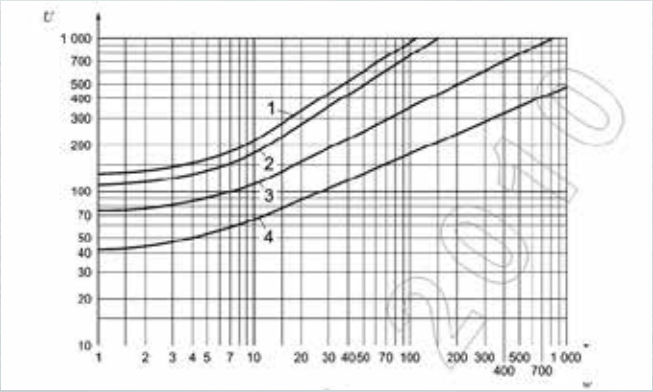


Diagram 1

NEW: Compensation Principle I:

- Low SNR: IQI score not reached " use lower X-ray voltage (increase contrast sensitivity) " longer exposure times
- High SNR " use higher X-ray voltage " IQI score reached and shorter exposure time

NEW: Compensation Principle II:

With the new ISO 17636-02 it is allowed to compensate contrast sensitivity by spatial resolution or vice-versa.

- A lower spatial resolution i.e. a lower double wire score (D) may be compensated by a higher contrast sensitivity i.e. higher single wire score (W), or vice-versa.
- Max. two singe/double wire scores may be exchanged.

See examples in *Illustration 2*:

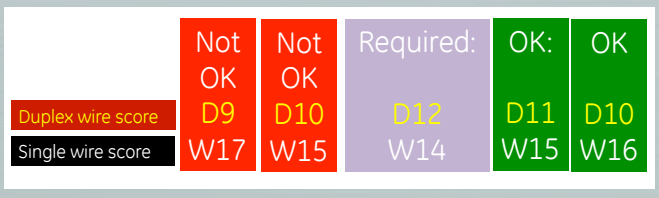


Illustration 2

D. Minimum normalized signal to noise ratio (SNRN)

The ISO 17636-02 uses the concept of the SNRn taken from EN14784-1.

Minimum values tabulated in function of radiation energy and object thickness, similar to *Table 2* of

EN14784-2. However, the SNRn requirements are more stringent as in the EN14784-2.

Table 3 shows that there is guidance on the minimum SNRn required as well as the appropriate scatter control.

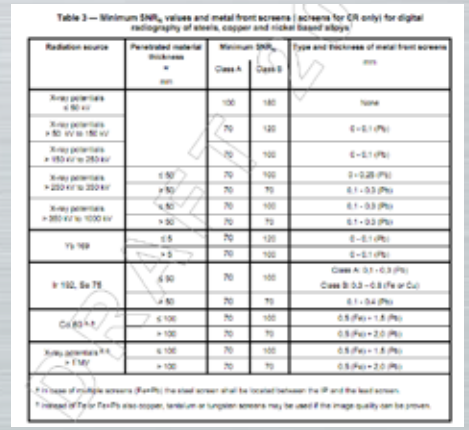


Table 3

E. Anti-scatter filter type & thickness

Anti-Scatter Filtering is especially important with Phosphor Imaging Plates, as their high sensitivity would pick up scatter radiation. This affects the image SNR negatively. While this point is the same with Film Radiography, the importance of collimating the source and doing appropriate scatter control must always be a priority for the image quality as well as for adhering to the ALARA principle.

F. Source Detector Distance

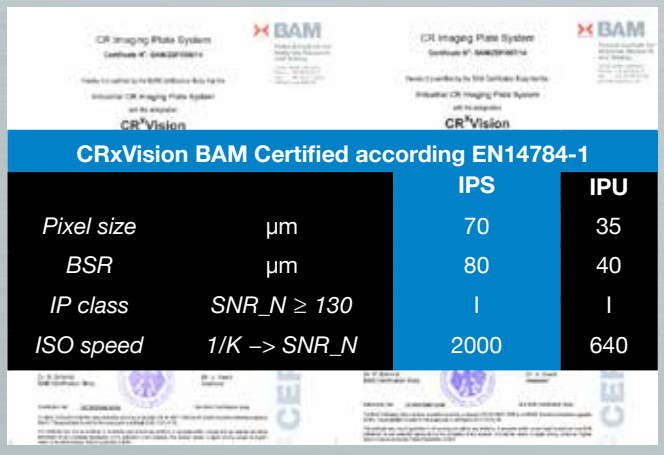
This point is of the same relevance as the corresponding Film Standards. No change when moving to Digital. IPSIPUPixel sizeµm7035BSRµm8040IP class SNR_N ≥ 130IIISO speed1/K" SNR_N2000640CRxVision BAM Certified according EN14784-1

3. CRxVision Scanner for Weld Applications

With the new standards in place guiding inspectors on how to use Digital RT for weld applications, GE has designed and engineered the next generation of CR scanners catering not only to the exact need of standard compliant processing, but also focusing on doing this at reasonable exposure times of no longer than film and scanning cycles that are much faster than film processing cycles.

3.1 System Speed

Table 4 shows that with an ISO speed of 2000 on IPS Imaging Plates, scanned at 70 µm resolution and 640 ISO speed on IPU Imaging Plates, scanned with 35 µm resolution, the system class I (i.e. SNRn >130) is reached.



CRxVision BAM Certified according EN14784-1			
		IPS	IPU
Pixel size	µm	70	35
BSR	µm	80	40
IP class	*SNR_N ≥ 130*	I	I
ISO speed	*1/K –> SNR_N*	2000	640

Table 4

In real use, this means that ISO 17636-02 requirements on SNR can be achieved with very low doses, resulting in exposure times that are the same as on film. For IPS, the equivalent film speed is that of an Agfa D7 film. For IPU plates it would be the equivalent of a D4 film speed.

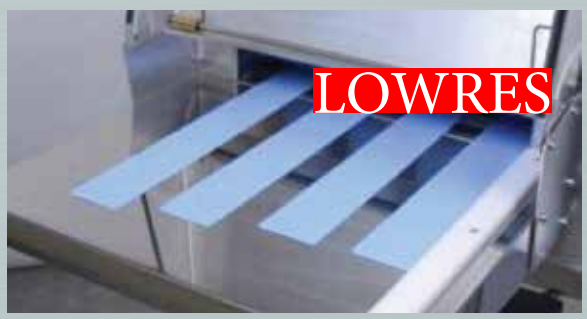
3.2 System Mechanics to Handle IP

Another relevant feature is the new plate handling mechanics that now ensures that the scanner is not touching the sensitive surface of the IP and thus will not add to the wear of the imaging plate.

A common problem on most scanners is that contamination on the IP would result in scratch marks when picked up by the handling and transport systems of the scanners. Scratches that cover the area of interest would indicate that a plate can no longer get used for weld applications.

CRxVision Imaging Plates are coated with a ferrous backside. The scanner has a magnetic transport that will only transport the plate on the backside. Nothing touches the front-side of the IP.

The system is an inline system and features multiple plate handling. See *Picture 1 and Picture 2*.



Picture 1

Picture 2

4. Evaluation of the Scanner

When testing the scanner against the new ISO 17636-02 requirements, we first have to determine the system un-sharpness (BSR).

For different applications the BSR is determined with a different radiation quality. *Table 5* with *Remarks 1* shows the results.

Basic Spatial Resolution (in µm) according ISO17636-2 Annex C			
Exposure Conditions	Radiation - source filtration	IPS	IPU
1. Light Alloys	90kV - 1mm Al	80	40
2. Steel & Copper t ≤ 20mm	220kV - 1mm Cu	80	40
3. Steel & Copper t ≥20mm	220kV - 2mm Cu	80	50
4. Isotopes	SE 75 - 2mm Cu	80	50
5. Isotopes	IR192 - 2mm Cu	100	n.a.

Table 5

- IPU loses one duplex wire for large steel thicknesses and SE75 isotope
- IPS loses one duplex wire for IR192

Remarks 1

In a second step, we tested the BSR with the Scanner IP combination for all thicknesses referred to by the standard. *Tables 6 and 7* show the BSR compliance of the System with the ISO 17636-02, where the white areas are exposed with IPU plates and 35 µm scan resolution and the grey fields were exposed with IPS plates and 70 µm scan resolution.

ISO 17636-2 Class B	
Penetrated thickness w (a) in mm	Maximum BSR
w ≤ 1,5	40
1.5 < w ≤ 4	50
4 < w ≤ 8	63
8 < w ≤ 12	80
12 < w ≤ 40	100
40 < w ≤ 120	130
120 < w ≤ 200	160
w > 200	200
For double wall technique, single image, the nominal thicknesst shall be used instead of the penetrated thickness w.	
CRx Vision 70µm pixel & IPS imaging plate	

Table 6

ISO 17636-2 Class A	
Penetrated thickness w (a) in mm	Maximum BSR
w ≤ 1.0	50
1.0 < w ≤ 1.5	63
1,5 < w ≤ 2	80
2 < w ≤ 5	100
5 < w ≤ 10	130
10 < w ≤ 25	160
25 < w ≤ 55	200
55 < w ≤ 150	250
150 < w ≤ 250	320
w > 250	400
For double wall technique, single image, the nominal thicknesst shall be used instead of the penetrated thickness w.	
CRx Vision 35µm pixel & IPU imaging plate	

Table 7

Besides the scanner requirements for BSR, we also had to test the scanner for IQI and normalized SNR compliance.

Table 8 shows the results for the CRxVision scanner for the more stringent Class B with 3 Remarks on exposures with IR192. The remarks suggest the Compensation Principles get applied for those thicknesses.

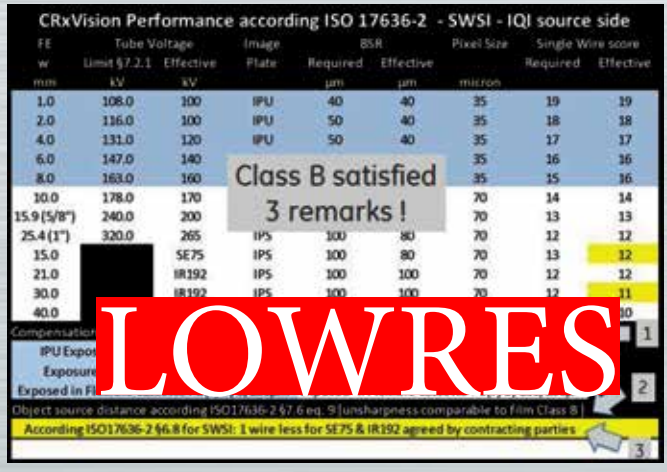


Table 8

4.1 Summary

The GE CRxVision system is evaluated according to the current standard ISO 17636-2 for radiographic testing of welds with digital detectors.

The system fulfills the System Class B according to ISO17636-02

- For wall thickness from 1 mm to 9 mm (SWSI)
  a. Class B is reached with CRxVision and 35µm pixel size.
  b. The use of the IPU image plate is required.
- For wall thicknesses from 10 mm to 40 mm (SWSI)
  a. Class B is reached with CRxVision and 70µm pixel size.
  b. The use of IPS Plates is required

5. References

1) ISO 17636-02
Non-destructive testing of welds — Radiographic testing —Part 2: X- and gamma-ray techniques with digital detectors

Remote Inspection Process Control & Efficient Productivity Gain with GE Mentor EM

On 14 August 2015 at the NTU Alumni Club

The talk was presented by Mr Ken Low who is the Product Sales Manager, he joins GE Inspection Technologies/ GE Oil & Gas in 2011 with more than 10 years of NDT experience in the OGC industry. Mr Low has ASNT Level 2 qualifications in various methods and work as a NDT field sales engineer and is familiar with eddy current, ultrasonic & radiographic testing.

GEIT Mentor EM Eddy Current Method brings inspectors to the Cloud and can be developed into a portable system connected to the Industrial Internet that allows mechanics to test parts and tap on the wisdom of the crowd to analyse them. “MENTOR is able to meet the needs in the marketplace to lower the learning curve for young inspectors and transfer knowledge to them from older workers with regards to electromagnetic eddy current testing.”

The technology is similar to GE systems already working in the medical field. Rural doctors in Sweden for example, use it to share patient X-rays with specialists at a central hospital. The goal is to provide radiologists with quick access to patient files and images, reducing the number of duplicate exams while speeding up second opinions.

Mr Ken Low shared with us the versatility of the portable GEIT Mentor EM electromagnetic eddy current testing system and its system can be connected to the industrial internet which allows younger inspectors to inspect at site from airplanes to weld joints and pipeline walls.

It is also able to record testing data, matching it with inspection guidelines developed by experienced inspectors. The system can also display the results on tablet-like devices by digitising the paper trail.

Like other non-destructive diagnostic tools, the system uses eddy current to detect tiny cracks inside parts or under layers of paint. The probe generates a complimentary magnetic field that induces eddy current in parts made from conductive materials. Defects change the flow of the current and alter the magnetic field.

Reading the signals however, is a complex task that often requires years of expertise with the instrument. Even experts frequently rely on thick field manuals to read the data and compare notes with colleagues to interpret the results.

Our participants had a chance to have a hands-on experience on how the Mentor EM system incorporates advanced software that can assist with collecting data for subsequent review. The software also incorporates real-time collaborations with remote experts which allows fast and accurate indication confirmation as well as decisions. Technicians can use it to communicate with their peers around the world. The software allows for data input, analysis, image review, reporting, data management, remote collaboration and storage.

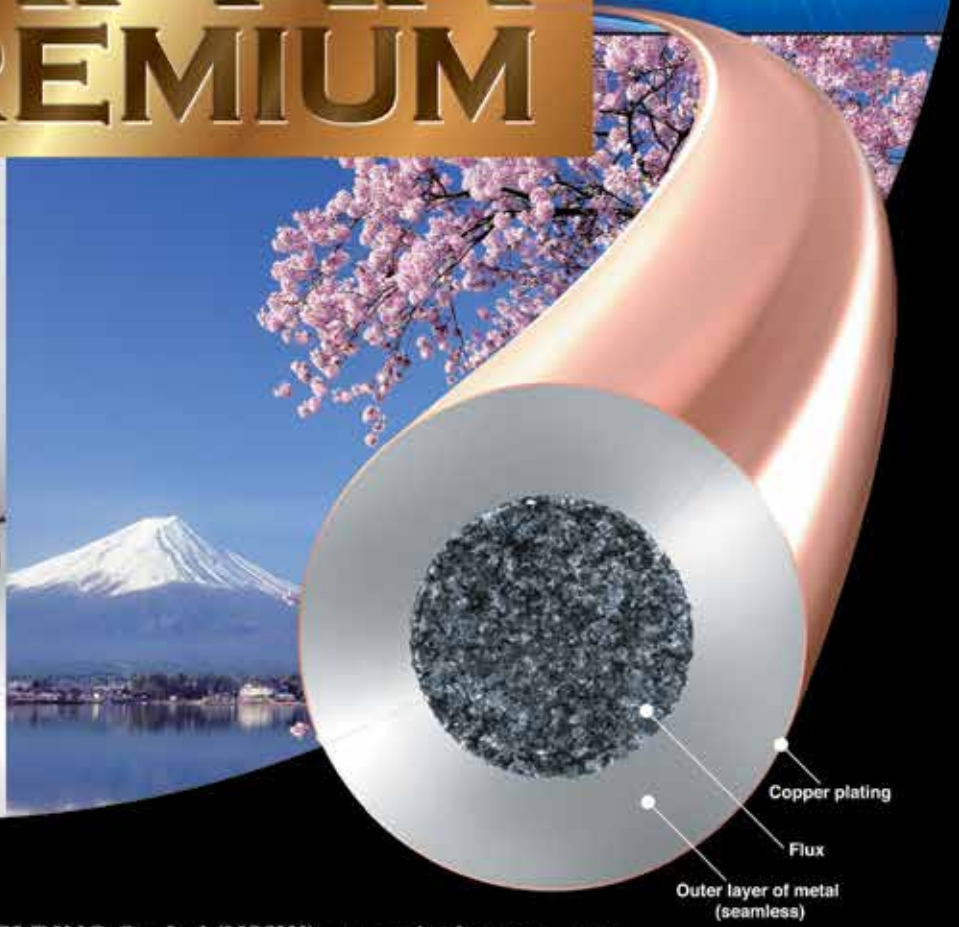
The best eddy current inspectors are not getting younger. Some 40 percent of them are 56 years old or older. “There’s a problem with the pipeline of technicians,” Mentor EM will help to bridge the skills gap.

The features and benefits of eddy current testing is different from other non-destructive testing method in one important aspect - the equipment used, in particular the probes, is specific to the inspection task. Eddy current testing is therefore inherently flexible and in order to get the best results, it is vitally important to choose the optimum probe for each task to be used with the Mentor EM.

NIPPON STEEL & SUMIKIN WELDING

High Quality Welding Consumables & Equipment

JAPAN PREMIUM



We, NIPPON STEEL & SUMIKIN WELDING Co.,Ltd.(NSSW), are a subsidiary company of Nippon Steel & Sumitomo Metal Corporation (NSSMC) which is one of the biggest steel makers. Over 80 years, we supply the breakthough welding consumables used for FCAW,SMAW,SAW,GMAW,GTAW and various welding equipment included plazma welding to match and enhance your welding skill. We are the first and only japanese manufacurer to mass produce the Seamless Flux Cored Wire since 1981, which has excellent performance and quality for low temperature and high-tensile strength use.

We promise to provide appropriate solutions and create a breakthrough for your welding situation.

NIPPON STEEL & SUMITOMO METAL CORP. GROUP

Nippon Steel & Sumikin Welding Co., Ltd.

http://www.welding.nssmc.com/en/

Cut much FASTER
anywhere even without an external air compressor

Cut SAFER
without any flammable gas tanks

Cut with CONFIDENCE
on all kinds of metals that you have

Contact us at marketing.asia@hypertherm.com or call us at 6841 2489 and quote "SWS" to enjoy special discounts for our full range of Powermax. Valid till 31 December 2015.

Introducing the all new Powermax30® AIR (built-in Air Compressor)

When was the last time you cut with Confidence?

Be it severing a 57mm stainless or mild steel plate or carrying a portable cutting machine to unfavorable working areas, Hypertherm has just the right solutions for you. Whether you are in the shipping, automotive, metal fabricating, construction or maintenance & repair sector; if you need mobility, cut depth and speed at work, Hypertherm is the industrial cutting solution you need. With half a century of metal cutting experience, we want to enhance your experience in metal cutting and deliver a higher notch of productivity for your businesses.

View video here

Hypertherm®
Cut with confidence®

PLASMA | LASER | WATERJET | AUTOMATION | SOFTWARE | CONSUMABLES

Welding Solutions to Meet the Most Demanding Requirements - Yours!

FLEXTEC® 650 Invertec Racks
LN-25 PRO Wire Feeders

Imagine this...four compact FLEXTEC® 650 multi-process welders packed into a rugged rack for multiple welding operators on the job site. That's up to 815 amps of welding power or 12mm carbon arc gouging per operator. Low power consumption, small size, low weight, IP23 weather-resistant rated and remote control ready - that's some serious job site productivity.

Combine this with the LN-25 PRO Wire Feeder - designed to be simple, reliable and easy to service. Whether you are an ironworker, pipeline welder, offshore fabricator, shipbuilding facility or metal fabrication shop, we have the right semi automatic wire feeder for you.

At Lincoln Electric we provide a complete portfolio of products to address your tough offshore welding application requirement.

LINCOLN ELECTRIC

The Lincoln Electric Company (Asia Pacific) Pte Ltd
25 Pandan Crescent, #06-13, Singapore 128477
Tel: +65 6854 5360 Email: info@lincolnelectric.com.sg

Shown:
Invertec® FLEXTEC® 650 Rack/LN-25 Pro Wire Feeder

SINGAPORE WELDING COMPETITION 2016 ANNOUNCEMENT

Winners and Runner Ups of 'SWS Welding Competition 2014' with their Employers and SWS Council members

Singapore Welding Society (SWS) will be organizing the Singapore Welding Competition 2016 on 16-17 March 2016. This event aims to promote welding excellence in Singapore and also provides a rare opportunity for the gathering of the best welders in Singapore to exhibit their skills.

Our 2016 welding competition will be an interesting and rewarding one. GTAW will be added as one of the competition processes for the coming event. The winners will then represent Singapore to compete at the 2016 Beijing 'ARC Cup' International Welding Competition, which will be held in Beijing, China in June 2016.

Qualification for Participation

1. Male or female, born between 1 Jan 1981 and 31 Dec 1998
2. Working in Singapore
3. Employer is a Corporate Member of SWS

Welder Test / Competition Details

The Competition will be in the following three welding processes

- Manual Shielded Metal Arc Welding (111/SMAW)
- Gas Metal Arc Welding (135/GMAW)
- Gas Tungsten Arc Welding (141/GTAW)

Judging Criteria

- Visual Inspection (VT) and Radiographic Test (RT)
- The decision by the panel of judges will be final and no appeal will be entertained
- More details on the workpiece and 'Welding Procedure Specification' will be available upon registration.

Awards

1. Winners for SMAW, GMAW and GTAW categories
   - S$800 cash each and honored with a medal and Certificate from SWS
   - Sponsored to represent Singapore in the 2016 Beijing "ARC Cup" International Welding Competition in Beijing, China (return air tickets, food and accommodation)
2. Runner Ups for SMAW, GMAW and GTAW categories
   - S$500 cash each
   - Honored with a medal and certificate from SWS
3. All participants will be awarded certificates from SWS
4. For Employers: Commendation plaques will be awarded to the employers of the Winners and Runner Ups

Registration Schedule

Closing date for registration is 15 February 2016. Details of the venue, schedule and prize presentation ceremony will be available to all participants by end February 2016.

For any clarification, please contact Miss Carol Lau of the Singapore Welding Society at Tel: 67797706 or email to carol@imos.com.sg.

SINGAPORE WELDING SOCIETY
PRESENTS

MEMBER-GET-MEMBER (MGM) CAMPAIGN 2015~2016
A Membership That Pays You!

SWS members, you know how beneficial SWS membership is to technical and career development! Share your SWS membership experience and recruit new members.
SWS rewards your efforts in recruiting new members. Get going today!

Campaign period:
20 Oct 2015- 31 Mar 2016
(Reward vouchers will be given out at our SWS Members Night in April 2016)

No. of new members recruited by you	Rewards by membership type	
	Full / Associate / Student	Corporate
1	$10	$30
2-3	$30	$90
4-6	$70	$210
7-10	$130	$390
11-15	$210	$630
16 & above	$310	$930

Members who had recruited 4 or more new members will be eligible for an entry into the Grand Lucky Draw to be conducted at the SWS Members Night 2016. There will be a single draw for a winner! Lucky draw prize is $300 vouchers

Participation Rules & Conditions

1. This SWS Member-Get-Member (MGM) campaign is only open to SWS members who have no outstanding membership dues.
2. A 'new member' is an individual or company who has not held a membership with SWS during the past one year.
3. Campaign period: 16 Oct 2015 to 31 Mar 2016. Reward vouchers will be given out at our SWS Members Night in April 2016. Grand Lucky Draw will be conducted at the SWS Members Night 2016.
4. The new applicant shall indicate the name of the recruiter and the recruiter's membership number in the "Remark" section when submitting their membership applications.
5. Please contact SWS Secretariat @ 6779 7706 for any queries. Decisions by the Chairman, Membership Committee and SWS Council will be final.

LIST OF MEMBERS - September 2015

Corporate		
Arunasalam Panirselvam	Technical Manager	CMT (Testing) Pte Ltd
Full		
Schweizer Juerg	Director	Axcon International Pte Ltd
Anaiyappan Partheban	Assistant Engineer	Dyna-Mac Engineering Services Pte Ltd
Kovindaraj Kanagaraj	Supervisor	JEL Maintenance Pte Ltd
Yap Hong Ping	Mechanical Engineer	PSA Corporation Ltd

LIST OF MEMBERS - October 2015

Full		
Agus Juli	Senior Plant Inspector	Advance Inspection & Testing (S) Pte Ltd
Loganathan Jayakumar	Plant Inspector	Dacon Inspection Services Co., Ltd
Culala Alvin	Plant Inspector	Setsco Services Pte Ltd
Muhammad Syafiq Bin Samsudin	Plant Inspector	Dacon Inspection Services Co., Ltd

SWS WELDPOINT AD RATES

Advertisement Rates 2016 Per Issue

POSITION	FPFC	FC 1/2 PAGE	FC 1/4 PAGE	FREQUENCY DISCOUNTS
Run On Page (ROP)	$500	$400	$250	4 x 15% discount (consecutive issues)
Outside Back Cover	NA	$500	NA	
Inside Back Cover	NA	$450	NA	
Specified Spot (other than already mentioned) requires additional 10% loading				

FPFC - Full Page Full Color
FC - Full Color
Price quoted in Singapore Dollar and open to all SWS Corporate Members only.

Size Specifications

Size	Trimmed (mm)	Type Area (mm)	Bleed (mm)
Full Page	275(H) x 205(W)	250(H) x 185(W)	280(H) x 210(W)
Half Page Horizontal	135(H) x 205(W)	120(H) x 185(W)	140(H) x 210(W)
Half Page Vertical	275(H) x 100(W)	250(H) x 89(W)	280(H) x 105(W)
Quarter Page Vertical	138(H) x 105(W)	126(H) x 93(W)	143(H) x 110(W)

H - Height
W - Width

Look what's new at Sandvik!

Nickel Alloy welding Consumables

Mig Wire
Sanicro 60 (ERNiCrMo-3)
Sanicro 72HP (ERNiCr-3)
Sanicro 53 (ERNiCrCoMo-1)
Sanicro 54 (ERNiCrMo-10)
Sanicro 56 (ERNiCrMo-4)
Sanicro 59 (ERNiCrMo-13)
Sanicro 68HP (ERNiCrFe-7)

Submerged Arc Wire & Flux
Sanicro 60 (ERNiCrMo-3)
Sanicro 72HP (ERNiCr-3)
Sanicro 53 (ERNiCrCoMo-1)
Sanicro 54 (ERNiCrMo-10)
Sanicro 56 (ERNiCrMo-4)
Sanicro 59 (ERNiCrMo-13)
Sanicro 68HP (ERNiCrFe-7)

Sanpac
Sanicro 60 (ERNiCrMo-3)
Sanicro 72HP (ERNiCr-3)

Tig Rods
Sanicro 60 (ERNiCrMo-3)
Sanicro 72HP (ERNiCr-3)
Sanicro 53HP (ERNiCrCoMo-1)
Sanicro 54 (ERNiCrMo-10)
Sanicro 56 (ERNiCrMo-4)
Sanicro 59 (ERNiCrMo-13)
Sanicro 68HP (ERNiCrFe-7)

SMAW Electrodes
Sanicro 60 (ENiCrMo-3)
Sanicro 71 (ENiCrFe-3)
Sanicro 69 (ENiCrFe-7)

Strip Electrodes
Sanicro 60 (EQNiCrMo-3)
Sanicro 72HP (EQNiCr-3)
Sanicro 41Cu (EQNiFeCr-1)
Sanicro 69HP (EQNiCrFe-14)

Stainless Steel • Nickel Alloy • Welding • Technical Advice • Welding Presentations and Training
Draft preliminary WPS where required

Sandvik South East Asia Pte Ltd
50 ALPS Avenue, #04-00, Sandvik Building, Singapore 498782 • Email : sg.smt@sandvik.com • Hotline : +65 6477 3788

SANDVIK

METRODE
WELDING CONSUMABLES
A Lincoln Electric® Company

Alloyed Welding Consumables

Metrode offers one of the largest ranges of alloyed welding consumables available from a single source. The products range from those suitable for low alloy steels, through numerous diverse steels, to those matching the performance of nickel-based alloys.

Regional Office:
The Lincoln Electric Company (Asia Pacific) Pte Ltd
25 Pandan Crescent, #06-13, Singapore 128477
Tel: +65 6854 5360 Email: jack.phang@metrode.com
www.metrode.com

I am the Number One Seamless Cored Wire

Engineered by the Leading Welding Consumables Developers

I am from strong European quality traditions with ultra-low diffusible hyrogen. I make welders proud.

My Seamless design offers :

- Optimal protection against moisture re-absorption and thereby against hydrogen induced cracking.
- Extremely low levels of diffusible hydrogen 2-3ml/100g weld metal, regardless of duration of storage and time of exposure at the work site.
- Excellent arc stability with high corrosion resistance due to copper coated surface.
- Excellent on-target wire feeding even at high welding speed.

I weld O&G Upstream fixed and floating structures, Chord and Racks, Topsides and modules, Offshore Cranes and Ship's.

I am the world's number one Seamless cored wire – from voestalpine Böhler Welding.

voestalpine Böhler Welding
www.voestalpine.com/welding

voestalpine
ONE STEP AHEAD.

OTC ROBOTICS:

Technologically Advanced Welding Robots

Boasting a technologically advanced series of robotics, OTC DAIHEN offers the most effective solutions for the automation of welding. OTC is a leading manufacturer of welding & cutting equipment, torches, positioning equipment, standard & custom arc welding cells, accessories and robots such as its OTC Almega All advanced series of Arc Welding Robots.

Utilising the latest technology available in the industry, OTC DAIHEN's range of products provides businesses with optimal solutions for any CO2, MAG, MIG, TIG, and air plasma cutting application.

Leeden

Leeden Distribution Pte Ltd
1 Shipyard Road, Singapore 628128
E: sgsales.welding@leedenlimited.com
www.leedenlimited.com

T: (65) 6268 1221
F: (65) 6268 2838

Singapore • Malaysia • Indonesia • Thailand • China • Vietnam • Philippines • Australia

Metallurgical Know-How for Tough Welding Solutions

voestalpine Bohler Welding Asia Pacific
8 Boon Lay Way, #06-03 Tradehub 21
Singapore 609964
Phone: +65 6896 9780, Fax: +65 6896 9786
Email: sales.apac@voestalpine.com

Join the highest level of welding performance
www.voestalpine.com/welding

voestalpine
ONE STEP AHEAD.